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A COMMUNICATION SERVICE

This invention relates to communication services. It is related particularly, but not exclusively, to streaming in a multimedia messaging service.

Electronic mail, or e-mail is a messaging service, which allows quick and economical communication in electronic form. Using the Internet, e-mail messages can be sent all over the world, in many cases practically free of charge. Furthermore, the same message can be sent to a plurality of recipients. This technique is called multicasting. As the relaying of messages is entirely automated, the messages can arrive very shortly after they are sent. E-mail messages can carry computer files such as documents, program files, and different media files like audio- or video clips.

Ordinary home users having Personal Computers (PCs) prefer not to have a permanent connection to their e-mail system (for example to the Internet) but rather to set up a temporary and remote connection to an e-mail server that stores messages received since a previous e-mail reading session. Using this kind of connection and an e-mail reading program, new e-mails can be transferred from the e-mail server to the memory or a hard disk of the PC and then be read either while the connection is still extant, or alternatively after the connection has been closed. The transmission of data between the home PC and the e-mail server is typically carried out using a modem attached to the PC.

In the following, the term "sender" refers to a device that sends data intended for a receiver and "receiver" refers to a device that receives the data and to which the data was intended. The operation of e-mail systems is well known to a person ordinarily skilled in the art, but some major principles are next described at a generic level.

Figure 1 shows a schematic diagram of an Internet-based e-mail system 10 comprising a sender 11, a receiver 15 and, the Internet 12 having a sender's e-

mail server 13 and a receiver's server 14.

In the Internet, e-mail messages are sent using certain well-known protocols. Simply speaking, an e-mail message, once composed, is packaged into a single unit, stamped with an address of the receiver and is sent to the sender's e-mail server. The sender's e-mail server forwards the message through the Internet to the receiver's e-mail server. The next time the receiver forms a connection to the receiver's e-mail server via the Internet and checks whether new e-mails have been received using the e-mail reading program, the receiver can download any newly received message over the connection (e.g. modem link). When the message has been received completely, it can be presented to the user. It should be noted that during the various stages of its transmission, the e-mail message is typically split into numerous smaller packets according to the data transfer protocol(s) used. On reception, the receiver gathers together all of the packets, assembles them into the correct order (if necessary) and reconstructs the e-mail message into its original form, before presenting the message to the user.

The e-mail transmission system described above is convenient and provides the possibility for multicasting, but it is best suited, and originally intended, for receiving messages and then presenting them at the convenience of the user. Thus, the content of a given e-mail message can only be accessed after completion of message transmission to the receiver. This is not a real problem with plain text messages, but in the case of a large media or multimedia content (clip) it is a drawback that the user of the receiver cannot start presentation of the clip while it is still being downloaded. Another drawback is that in order to receive a message, the receiver must have a sufficiently large memory to accommodate the entire message. Particularly in mobile communications networks, or any other network in which part of the communications link is formed by a radio connection, it is also problematic to receive a long message without interruptions or errors, for example due to a temporary loss of or deterioration in radio coverage. Mobile terminals also tend to have limited memory available for the storage of received messages, which further exacerbates the problem associated with the accommodation of messages in the receiver. These problems are at least partly

mitigated by the Multimedia Messaging Service (MMS).

The Multimedia Messaging Service (MMS) is a new end-to-end messaging approach for one-way transmission of messages having text and/or (multi)media content. MMS provides the possibility of sending messages between mobile users and between a mobile user and the Internet. There is already an agreed solution for implementation of a Multimedia Messaging Service in 3rd Generation mobile communication networks. The currently specified features of the proposed Multimedia Messaging Service are described in 3rd Generation Partnership Project (3GPP) technical specification 23.140 V.3.0.1. "Multimedia Messaging Service (MMS), Functional Description, Stage 2 (Release 1999)". The Multimedia Messaging Service proposed in 3GPP 23.140 employs a store-and-forward approach to message delivery. Multimedia messages are constructed in such a way that the media content, information necessary to describe the media content and addressing information, identifying the intended receiver of the message, are encapsulated together. The message is then sent to a Multimedia Messaging Service Centre MMSC, which in turn notifies the receiver about the message. The message is downloaded by the receiving terminal as a whole and only presented to the user once downloaded and stored in the receiving terminal.

It should be appreciated that although the term "multimedia message" is used generally to describe a message that contains more than one type of content, in the context of the description provided in this application, the term extends to cover messages that contain only one media type.

As currently specified, the Multimedia Messaging Service has a drawback: The receiving terminal must store the message before it can be presented to the user. Therefore the size of the memory of the receiving terminal sets an upper limit on the size of messages that can be downloaded. WO 99/166746 solves this problem by dividing the message into sub-messages (segments) if the entire message does not fit into the memory of the receiving terminal. These sub-messages are small enough so that the receiving terminal can individually download each of them as a whole. In that case, the receiving terminal initially downloads a first sub-

message. After the first sub-message has been fully downloaded, the receiving terminal can present it. After presentation of the first sub-message, the receiving terminal can download a second sub-message and then present it. Each sub-message is downloaded and then presented one by one. The size of the sub-messages depends on the memory size of the receiving terminal and must be at least as small as the memory size.

Apart from MMS, there are streaming-techniques known from the fixed line Internet. "Streaming" is a term used generally to describe the presentation of a media stream, for example an audio or video stream, or a combination of different streams, in a continuous way while those streams are being transmitted to a client over a data network. A "stream" is, respectively, a flow of data typically enabling the receiver to present some continuous data such as motion picture, voice or music. In a typical video stream, some 10 to 20 video frames are transmitted per second. In practice, streaming can be either live (real-time) or performed in an on-demand fashion. As its name suggests, "live streaming" describes the creation of a media stream from a live source, for example a stream of digital images produced by a video camera, while "on-demand streaming" describes the creation of a media stream from, for example, a file stored on a server.

Within streaming there are two very important functionalities, namely streaming control and media transport. Streaming control takes care of establishing, managing and terminating a streaming session using a negotiated or pre-configured set of parameter values. Media transport concerns the transportation of media during the established session using an agreed or negotiated transport protocol. For example, there are widely agreed protocols in the Internet domain to provide both streaming control and media transport functionalities and these can be used as transport protocols in streaming applications.

Whilst streaming is widely used in the Internet, it has still to be adapted for use in mobile communication networks. It should be appreciated that the use of streaming is very promising in mobile networks, especially considering the fact that mobile terminals typically have limited storage capacity (memory). However,

present mobile communication networks do not support streaming for reasons described in the following.

The encapsulation of media content, message description and addressing information in a single entity as proposed in current MMS specifications is incompatible with the streaming of media content. In order to establish a streaming session, it is necessary for the receiving terminal to be aware, in advance, of certain information relating to the media content. Such information includes, but is not limited to, the type of media contained in the message, the way that media is encoded and a suitable transport protocol that could be used to download the media content. Because current MMS specifications require information describing the media content to be encapsulated with the multimedia message itself, the receiving terminal cannot obtain prior knowledge about the properties of the media content and therefore cannot establish any form of streaming session. Thus, according to the present recommendations, the entire message must be downloaded to the receiving terminal in order for the details of the media content to be extracted. Only then can any media content, such as video and/or audio clips be played back to the user of the receiving terminal. This limits the usability of the known MMS solution because multimedia clips are usually bulky in terms of bits and therefore a receiving terminal, for example a mobile station, would require a comparatively large memory. The need to download an entire message before it can be presented may also give rise to significant delays in certain conditions, for example if the message is very large, or the data transmission rate of the connection is low.

It should further be emphasised that the addressing scheme suggested by current Multimedia Messaging Service specifications does not facilitate the implementation of streaming in such a system. The current MMS can be viewed as a "sender orientated" system. In other words, the sender decides what media content to send to the receiver, encapsulates that in the message and addresses the message to the intended receiver. Streaming, on the other hand, is more "receiver orientated". To establish a streaming session, it is generally necessary for a streaming connection to be formed between the receiver and the source of

media content, for example a network-based server, the content being streamed from the server once the necessary connection has been established. Thus, establishment of a streaming session requires the recipient to have knowledge of the location of the media content, and it does not necessarily require the media content to be directly addressed to the recipient.

Now a new solution has been invented where the problems of the prior art can be avoided or at least mitigated.

According to a first aspect of the invention there is provided a communication method comprising the steps of:

receiving content from a first terminal to a communication server;

receiving from the first terminal a first notification message to the communication server, regarding the content; and

sending a second notification message from the communication server to a second terminal;

characterised by the method further comprising:

forming a streamed session between the communication server and the second terminal; and

transmitting the content in sequential sub-parts from the communication server to the second terminal, during the streamed session.

The transmission of the content to the second terminal as a stream allows rapid access to the content as a recipient using the second terminal need not wait for the content to be received completely.

Preferably, the communication method further comprises the step of presenting at the second terminal the received content as a stream during the streamed session. The second terminal can start presenting the content immediately and possibly take certain measures (for example, pausing or aborting the data transmission) during the transmission.

Preferably, the method further comprises the step of deciding at the second

terminal to receive or not to receive the content, at a certain time, and the streamed session is only formed if the decision is to receive the content.

Preferably, the communication server comprises a content server for storing and transmitting the content and a notification server for receiving and transmitting notifications, wherein the content server and the notification server have a physical relationship selected from the group consisting of the following: a single unit, separate units, and separate units distributed at different geographic locations.

Preferably, the communication method further comprises the step of generating the content at the first terminal. Preferably, content generated at the first terminal is streamed to the content server and said sending of the content occurs during the generation of the content. By doing so the content can be made available to the user earlier than if content was generated wholly or to a large extent in the first terminal.

Preferably, when using streamed content generation, the first notification message is sent before content generation is complete, so that the second terminal can start receiving the content before its generation is complete.

Preferably, during the streamed session between the communication server and the second terminal, the receiver can issue an abort command to abort the session. Preferably, the streamed session is aborted in response to the abort command.

Preferably, the second notification message comprises information required by the second terminal in order to form a streaming session with the content server.

Preferably, the method is implemented as part of the Multimedia Messaging Service (MMS).

Preferably, the method further comprises the step of multicasting the content to at least one other terminal in addition to the second terminal in at least one other

streamed session.

In an embodiment in which there are a plurality of streamed sessions, each of the streamed sessions may be formed independently of any other, so that the sessions may start and end at different times or at the same time. Preferably, each of the sessions can be aborted independently of any other, responsive to each of the respective terminals.

According to a second aspect of the invention there is provided a communications system comprising a plurality of terminals, a communications network and a communication server, the system having:

means for generating at a first terminal content to be delivered to a second terminal;

means for sending the content from the first terminal to a communication server;

means for sending from the first terminal to the communication server a first notification message regarding the content; and

means for sending a second notification message from the communication server to the second terminal;

characterised by the system further comprising

means for forming a streamed session between the communication server and the second terminal; and

means for transmitting the content in sequential sub-parts from the communication server to the second terminal, during the streamed session.

Preferably, the system further comprises means for presenting at the second terminal the received content as a stream, during the streamed session.

According to a third aspect of the invention there is provided a communication server for serving a plurality of terminals in a communications network, the server comprising:

means for receiving content from a first terminal;

means for receiving from the first terminal a first notification message

regarding the content; and

means for sending a second notification message to a second terminal; characterised by the server further comprising:

means for forming a streamed session with the second terminal; and

means for transmitting the content in sequential sub-parts to the second terminal, during the streamed session.

According to a fourth aspect of the invention there is provided a computer program product comprising:

computer program code for causing a communication server to receive content from a first terminal to a communication server;

computer program code for causing the communication server to receive from the first terminal a first notification message to the communication server, regarding the content; and

computer program code for causing the communication server to send a second notification message from the communication server to a second terminal; characterised by the computer program product further comprising:

computer program code for causing the communication server to form a streamed session between the communication server and the second terminal; and

computer program code for causing the communication server to transmit the content in sequential sub-parts from the communication server to the second terminal, during the streamed session.

According to a fifth aspect of the invention there is provided a communication device comprising:

means for receiving a notification from a communication server regarding a message intended for the communication device;

characterised by the communication device further comprising:

means for forming a streamed session with the communication server for receiving a streamed message; and

means for presenting the streamed message during the streamed session.

According to a sixth aspect of the invention there is provided a computer program product comprising:

computer program code for causing a communication device to receive a notification from a communication server regarding a message intended for the communication device;

characterised by the computer program product further comprising:

computer program code for causing the communication device to form a streamed session with the communication server for receiving a streamed message; and

computer program code for causing the communication device to present the streamed message during the streamed session.

Preferably, the communication device is a wireless communication device. In an alternative embodiment, the wireless communication device is a wireless communication adapter adapted for providing wireless communication functionality to an external device such as a laptop PC.

According to a seventh aspect there is provided a method in a communication device, the method comprising the steps of:

receiving a notification from a communication server regarding a message intended for the communication device;

characterised by the communication device further comprising:

forming a streamed session with the communication server for receiving a streamed message; and

presenting the streamed message during the streamed session.

The invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of an Internet-based e-mail system;

Figure 2 is a diagram of a communication system according to a preferred embodiment of the invention;

Figure 3 shows the main protocol layers of streamed data transmission in the system of Figure 2;

Figure 4 shows the structure of messages sent during streamed data transmission to a receiver according to the preferred embodiment of the invention;

Figure 5 shows a block diagram of a mobile communications terminal incorporating a cellular radiotelephone according to the preferred embodiment of the invention; and

Figure 6 shows a radio adapter card for a laptop PC according to an alternative embodiment of the invention.

Figure 1 has been described already in the foregoing.

Next, a preferred embodiment of the invention is briefly summarised and then fully disclosed with reference to Figures 2 to 6.

According to a preferred embodiment of the invention, streaming is incorporated within the Multimedia Messaging Service. A three-phase approach is taken in this regard. In a first phase, a message, or more accurately, media content, is transferred to a media (streaming) server. In a second phase, a receiver is or receivers are notified that a media content is available for delivery. In a third phase, the media content is transferred to the receiver or receivers. Advantageously, the notification performed in phase 2, takes place by means of a notification message sent from the sending terminal via a Multimedia Messaging Server (MMS) to the receiving terminal. Typically, the MMS server stores the notification message and then tries to forward it to the receiving terminal. If it fails in the forwarding, it tries to re-send the stored notification message later.

Advantageously, streaming is performed in the first and third phases, namely while uploading the media content to the media (streaming) server and while downloading the media content from the media (streaming) server. It should be noted that streaming during the uploading phase (phase 1) is not an essential feature of the method according to the invention. However, the use of streaming in both phases 1 and 3 can reduce the delay between starting transmission of the

media content from the sending terminal and the commencement of streaming at the receiving terminal. It may also have the effect of reducing storage requirements in the media (streaming) server and can effectively enable implementation of real-time or near real-time streaming in the Multimedia Messaging Service.

Phase 2 of the method can be regarded as a message control phase, which takes care of forwarding message and streaming-related information to the recipient via the MMS server. Phases 1 and 2 may be performed sequentially or substantially simultaneously, while phase 3 can be performed automatically on receipt of the notification message at the receiving terminal, or at some later time at the discretion of the receiving user. Thus, the invention provides the flexibility to play the streamed media content at the receiving terminal at any time. The preferred embodiment does not impose any limitation on the size of the media content or the number of recipients in the case of multicasting. The preferred embodiment is based on a store-and-forward approach and it is thus in-line with other MMS solutions. This enables any media content that is not be streamed or is not of a type suitable for streaming to be downloaded to the receiver in a conventional manner that is as specified in current multimedia messaging specifications.

It is an advantage of the present invention that the implementation of streaming functionality can enhance the proposed MMS in many ways, particularly when the media content is large or it is to be multicast. The store-and-forward approach to streaming in MMS is effective and desirable, since it provides the recipient with complete flexibility to decide whether and when to receive and play back the media content within a multimedia message. The invention also provides streaming functionality within the framework of the proposed Multimedia Messaging Service and is thus fully compatible with the existing recommendations for its implementation.

The embodiments of the invention described hereafter outline the main steps for streaming under MMS.

Figure 2 is a diagram of a communication system 20 according to a preferred embodiment of the invention. The system 20 comprises a sending terminal, a Multimedia Messaging Service Centre (MMSC) having a media server 22 and an MMS server 23, and a receiving terminal 24.

In this example, the sending terminal 21 is a mobile terminal equipped with a video-camera and a microphone which creates media content (an audio/video clip) to be sent to a receiving mobile terminal. The receiving mobile terminal is equipped with appropriate presentation software and equipment to enable presentation of the media content (audio/video clip). The whole process is accomplished in three phases.

In the first phase, the sending terminal 21 establishes a streaming session with the media (streaming) server 22 which starts storing the media content in a predetermined location. This phase can be considered as a media upload phase.

In the second phase, the sending terminal 21 sends a notification via the MMS server 23 to the receiving terminal 24 about the media content being stored. The notification includes presentation description information required to establish another streaming session between the receiving terminal 24 and the media server 22. The presentation description information includes, but is not limited to, the following data: the network address of the media server, details of an access mechanism by use of which media content can be retrieved from the media server, the type of media to be streamed, the encoding method(s) used to encode the media content and an indication of the transport protocol(s) to be used for media downloading.

In the third phase, the receiving terminal 24 establishes a streaming session with the media server 22, based on the information received in the notification message and the receiving terminal starts to download and play the media content in the terminal. This phase can be considered as a media download phase.

The media server and MMS server can be merged together or maintained as different entities in the network depending on the service provider. The media server can be located, for example, in a mobile communications network or can reside in the Internet, possibly under the control of a service provider other than that responsible for provision of services in the mobile communications network.

When streaming is used both in the first phase and in the third phase, the second (notification) phase is performed during the first (media upload) phase and the third (media download) phase can also be started during the first phase. The sending terminal 21 continues to send the media content to the media server 22 while the media server 22 simultaneously sends those parts of the media content received earlier to the receiving terminal 24. The receiving terminal starts (and continues) playing back the media content with a total delay that depends on the streaming process, data transmission delays, and the time at which the third phase was initiated. If the third phase is not started automatically, but only after prompting and receiving permission from the user of the receiving terminal, the total delay is typically longer than if the third phase were to be initiated immediately the notification is received at the receiving terminal.

In an alternative embodiment the media content is already stored in the media server 22 and the sending terminal 21 knows the presentation description information of the media content. In this case the first phase can be skipped. As stated above, streaming of media content is not essential to phase 1. For example, a non-streaming approach to phase 1 can be used in connection with the provision of media content from a commercial (for example, news) provider located in a communications network, such as the Internet. The content provider updates the media content stored on the media server using non-streaming transmission over an IP connection and notifies potential recipients of media content about new clips of interest, using notification messages according to phase 2 of the invention. The recipients of notification messages would be, for example, users having a subscription with the particular content provider. Based on the notification message, at individually convenient time, each recipient can decide whether to form a streaming session with the media server in order to retrieve new media

content made available by the content provider. This also represents an example of a multicasting approach to streaming using the multimedia messaging system according to the invention.

According to an alternative embodiment of the invention, the presentation description information can be stored in a server other than the MMS server or the media server, for example in an e-mail or Web-server. In this situation, the notification message sent to the receiving terminal identifies the particular server on which the presentation description information is stored and an access mechanism (HTTP GET, WSP GET, IMAP4, POP3, RTSP DESCRIBE) can be used to retrieve the presentation description information from that location. Then the receiving terminal 24 can retrieve the presentation description information from the server identified in the notification message using the specified access mechanism. The presentation description information thus retrieved then guides the receiving terminal 24 to invoke phase 3 of the process for retrieving and playing the stored media content. If the server used to store presentation description information is an MMS server, the existing MMS solution can be used directly to retrieve the presentation description information. In this situation, the MMS notification from the sending terminal to the MMS server carries presentation description information and the presentation description information is stored in the MMS server. The notification from the server to the receiving terminal then carries the location of the stored presentation description, the server address and other required information. Finally, the receiving terminal follows the existing MMS solution to retrieve the presentation description from the MMS sever.

It should thus be noted that, in certain situations, the information content of the notification message sent from the sending terminal to the MMS server may be different from that sent from the MMS server to the receiving terminal.

According to a preferred embodiment of the invention, if the sending and receiving terminals are under the authority of different mutually linked MMS servers (that is they have different "serving" multimedia servers), the notification message is carried over the link between the MMS servers. The number of servers that may

be linked together between serving MMS servers is not limited for any end-to-end notification.

There are existing protocols for both streaming control and media transport in the Internet domain. Phases 1 and 3 can thus be implemented based on these existing protocols. In this way, the solution provided by the present invention also ensures interworking with the Internet, which is also an important objective of current MMS recommendations. Phase 2 conforms to existing MMS recommendations and thus provides backward compatibility with previously proposed mechanisms for non-streamed media content download.

Some practical approaches to accomplish the different phases of the preferred embodiment of the present invention are outlined below as examples.

The Real Time Streaming Protocol (RTSP) is a client-server streaming control protocol that enables controlled delivery of streamed multimedia data over an IP network. It is an application-level protocol and can work in conjunction with either the Transmission Control Protocol (TCP) or User Datagram Protocol (UDP). RTSP provides scope to use RTP/UDP or any other lower level protocol for media transport. RTSP comprises a set of methods/instructions to control streamed audio and/or video. In this regard, the most useful methods/instructions are OPTIONS, DESCRIBE, ANNOUNCE, SETUP, PLAY, PAUSE, TEARDOWN, REDIRECT and RECORD. The media upload and download can be implemented using SETUP, PLAY, RECORD, PAUSE and TEARDOWN.

The Hypertext Transport Protocol (HTTP) can also be used to enable and control the uploading and downloading of media content according to the invention, using TCP as a transport protocol. HTTP has methods/instructions PUT and GET, corresponding to RECORD and PLAY in RTSP, which can be used for media uploading (phase 1) and downloading (phase 3).

UDP is a connectionless lightweight transport protocol providing communication with comparatively low latency. RTP is purposely designed for real-time

communication and is implemented in such a way that it provides time-stamps and sequence numbers for data packets on top of UDP. Multicasting is possible using RTP. RTP is further designed to work in conjunction with the auxiliary control protocol RTCP (Real-time Control Protocol) to obtain feedback on the quality of data transmission and information about participants in an on-going session. Together, RTP and RTCP provide functionality and control mechanisms necessary for carrying real-time content and hence to enable streaming of media content and can thus be used in conjunction with the present invention.

TCP is a connection-orientated transport protocol. It ensures guaranteed and sequential reception of data packets at the cost of increased latency and larger overhead compared with UDP. Multicasting is not possible with TCP, but TCP can be used in streaming applications, if initial buffering time is not critical and the media clips to be streamed are comparatively short.

Message control functionality is required on top of streaming control and media transport layers in order to incorporate streaming in a multimedia messaging service. Figure 3 shows the main protocol layers of a streamed data transmission system according to Figure 2. The message control layer provides overall control of messaging functionality. For example, in a sending terminal the message control layer is responsible for the assembly of media content into messages and formation of notification messages containing information describing the media content, which are subsequently sent to the intended receiving terminal(s). In a receiving terminal, the message control layer is responsible for interpreting received notification messages, extracting information relating to the location of media content to be streamed and information necessary to form streaming sessions to retrieve the media content. The message control layer is also responsible for controlling the transmission and reception of any media content that is not be streamed/is not of a type suitable for streaming, according to existing multimedia messaging recommendations. The streaming control layer is controlled by the message control layer. It is responsible for forming a streaming session for each type of media content to be streamed, according to information provided by the message control layer, or according to predefined rules for each media type. It

is also responsible for controlling/regulating the streaming of media content once a streaming session is established. In a sending terminal, the streaming control layer is responsible for streamed uploading of media content to a media server and conversely, in a receiving terminal, it is responsible for controlling the streamed downloading of media content from the media server. Alternatively, streaming control functionality may be provided in the media server in a situation, for example, in which streaming is performed in phase 1 and 3 in such a way as to provide real-time or near real-time streaming of media content between sending and receiving terminals. Finally, the media transport is the layer that handles the actual transportation of data using an appropriate transport protocol. The choice of protocol may be predefined for different media types or may be indicated to the transport layer via the message control and streaming control layers in accordance with information provided in the notification message. In a preferred embodiment, the media streaming control adapts the streaming in accordance with the data transmission channel condition as notified by the media transport layer.

Figure 4 shows the structure of messages sent to a receiving terminal during a streamed media content download according to a preferred embodiment of the invention. It illustrates the flow of information to enable a media clip to be played in a receiving terminal using an RTSP session while using RTP/RTCP as a transport protocol. This gives an example of an approach that can be used for downloading a media clip in phase 3 of the present invention. DESCRIBE THE STAGES IN MORE DETAIL. By replacing the PLAY instruction with RECORD, a similar session suitable for media uploading in phase 1 of the invention can be implemented.

End-to-end notification is required for message control functionality because, as explained previously, a receiving terminal requires certain information concerning the media content to be streamed in order to take part in a streaming session. According to current multimedia messaging specifications, information describing media content is encapsulated together with the media content itself and thus cannot be sent independently to a receiving terminal. In the absence of such information, the receiving terminal is unable to download the media content by

streaming. By providing separate end-to-end communication of media presentation information, the method according to the invention supplies a receiving terminal with the information it requires in order to download media content by streaming. Furthermore, the existing non-streaming MMS protocol has scope to allow communication of media presentation information using end-to-end messaging via an MMS server rendering the method according to the invention compatible with current MMS recommendations.

Figure 5 shows a block diagram of a mobile communications terminal 50 incorporating a cellular radiotelephone. The mobile terminal 50 comprises a display 51, transmission and receiving means 52 for transmitting and receiving radio signals, a digital signal processor (DSP) 53 for processing data and voice into and from the radio signals, a user input device such as a keypad or keyboard 54, a central processing unit 55, the operation of which is controlled by software and memory means 56 for storing data and the software to enable the device to operate. The memory means is used by the DSP 53 and the CPU 55. The software comprises an operating system and applications for controlling the operation of the mobile terminal and for running certain applications such as MMS. The mobile terminal also comprises a removable smart card such as a SIM 57 for subscriber identification. The portion of the memory 56 that is dedicated to storing applications is so called non-volatile memory that keeps its contents even if the mobile terminal runs out of operating voltage. The applications can be stored in any of the ways known in the art, including factory installation, storing from a personal computer and downloading over the air, for example from a server in a communications network. All of these techniques are known, for example, from Nokia® 9110 Communicator.

Figure 6 shows a radio adapter card 61 for a laptop PC 62 according to an embodiment of the invention. The radio adapter card is fitted into a PCMCIA-slot of the laptop PC 62 (PCMCIA, Personal Computer Memory Card International Association).

There are various embodiments within the invention. RTSP is believed to represent a best mode for enabling and controlling streaming in phases 1 and 3. A certain degree of compromise in performance is required if RTP/UDP or TCP is used as a media transport protocol. Specifically, implementations using TCP do not provide multicasting functionality, as TCP is a connection orientated protocol. Nevertheless, TCP represents a viable alternative transport protocol that can be used in connection with the present invention. Indeed, its connection orientated nature may provide advantages in certain situations, particularly if a more secure streaming connection is desired. According to the preferred embodiment of the invention, the existing MMS protocol is used to provide end-to-end notification of presentation description information from the sending terminal to the receiving terminal via the MMSC in phase 2.

While the invention has been described in relation to its implementation in a communications network in which at least part of the network comprises a radio communication link, it should be emphasised that its use is not in any way limited to this kind of network. The invention may equally well be implemented in networks where the physical connections between the various elements of the network (sending terminal, receiving terminal and network servers) are implemented partially or entirely by means of fixed line connections.

Particular implementations and embodiments of the invention have been described. It is clear to a person skilled in the art that the invention is not restricted to details of the embodiments presented above, but that it can be implemented in other embodiments using equivalent means without deviating from the characteristics of the invention. The scope of the invention is only restricted by the attached patent claims.

Claims

1. A communication method comprising the steps of:

receiving content from a first terminal to a communication server;

receiving from the first terminal a first notification message to the communication server, regarding the content; and

sending a second notification message from the communication server to a second terminal;

characterised by the method further comprising:

forming a streamed session between the communication server and the second terminal; and

transmitting the content in sequential sub-parts from the communication server to the second terminal, during the streamed session.

2. A communication method according to claim 1 further comprising the step of:

generating the content at the first terminal.

3. A communication method according to claim 1 or 2 further comprising the step of:

during the streamed session, presenting at the second terminal the received content as a stream.

4. A method according to claim 2 or claims 2 and 3, comprising the step of streaming the content generated at the first terminal to the communication server.

5. A method according to claim 4 further comprising the step of sending the first notification message before content generation is complete.

6. A method according to any of the preceding claims further comprising the step of including in the second notification message information required by the second terminal in order to form a streaming session with the communication server.

7. A method according to any of the preceding claims, wherein the communication server comprises a content server for storing and transmitting the content and a notification server for receiving and transmitting notifications, wherein the content server and the notification server have a physical relationship selected for the group consisting of: a single unit, separate units, and separate units distributed at different geographic locations.

8. A method according to any of the preceding claims further comprising the step of:

Implementing the method as part of a Multimedia Messaging Service (MMS).

9. A method according to any of the preceding claims further comprising the step of:

multicasting the content to at least one other terminal in addition to the second terminal.

10. A communications system comprising a plurality of terminals, a communications network and a server, the system having:

means for generating at a first terminal a content to be delivered to a second terminal;

means for sending the content from the first terminal to a content server;

means for sending from the first terminal to a notification server a first notification message regarding the content; and

means for sending a second notification message from the notification server to the second terminal;

characterised by the system further comprising

means for forming a streamed session between the content server and the second terminal;

means for transmitting the content in sequential sub-parts from the content server to the second terminal, during the streamed session; and

means for presenting at the second terminal the received content as a

stream, during the streamed session.

11. A communication server for serving a plurality of terminals in a communications network, the server comprising:

means for receiving content from a first terminal;

means for receiving from the first terminal a first notification message regarding the content; and

means for sending a second notification message to a second terminal;

characterised by the server further comprising:

means for forming a streamed session with the second terminal; and

means for transmitting the content in sequential sub-parts to the second terminal, during the streamed session.

12. A computer program product comprising:

computer program code for causing a communication server to receive content from a first terminal to a communication server;

computer program code for causing the communication server to receive from the first terminal a first notification message to the communication server, regarding the content; and

computer program code for causing the communication server to send a second notification message from the communication server to a second terminal;

characterised by the computer program product further comprising:

computer program code for causing the communication server to form a streamed session between the communication server and the second terminal; and

computer program code for causing the communication server to transmit the content in sequential sub-parts from the communication server to the second terminal, during the streamed session.

13. A communication device comprising:

means for receiving a notification from a communication server regarding a message intended for the communication device;

charact ris d by the communication device further comprising:

means for forming a streamed session with the communication server for receiving the streamed message; and

means for presenting the streamed message during the streamed session.

14. A computer program product comprising:

computer program code for causing a communication device to receive a notification from a communication server regarding a message intended for the communication device;

characterised by the computer program product further comprising:

computer program code for causing the communication device to form a streamed session with the communication server for receiving a streamed message; and

computer program code for causing the communication device to present the streamed message during the streamed session.

Abstract

A communication method, where content is received from a first terminal to a communication server; a first notification message regarding the content is sent from the first terminal to the communication server; and a second notification message is sent from the communication server to a second terminal. Furthermore, a streamed session is formed between the communication server and the second terminal and then the content is transmitted in sequential sub-parts from the communication server to the second terminal during the streamed session. Corresponding communication system, communication server, communication device and computer program products are also described.

Fig. 2.

PRIOR ART

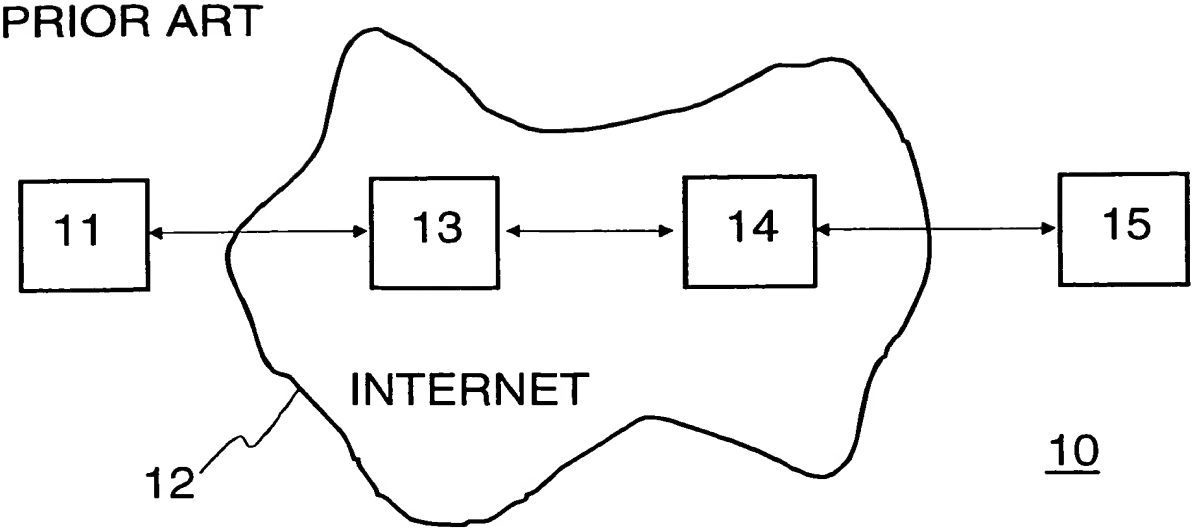

Fig. 1

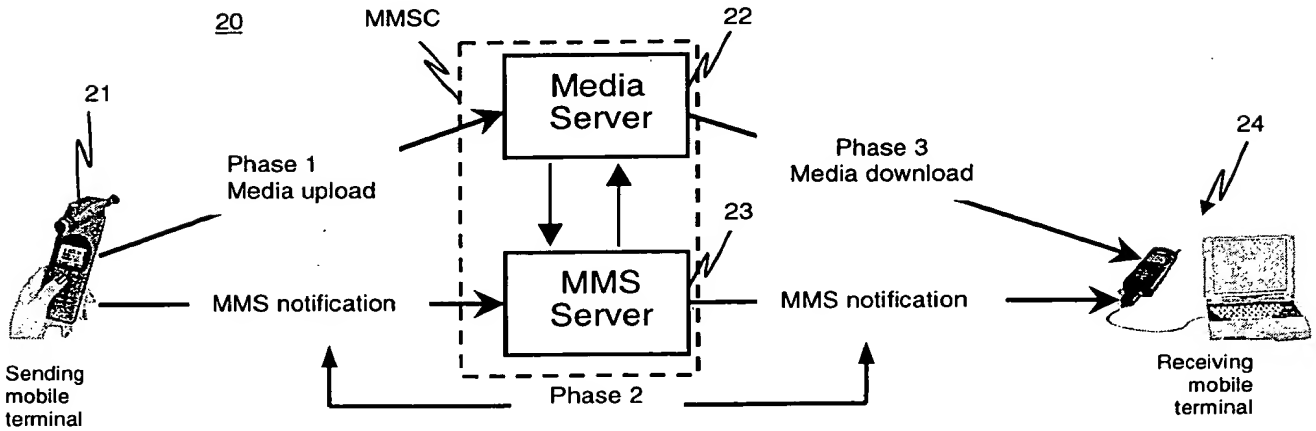

Fig. 2

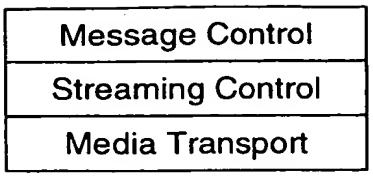
Message Control
Streaming Control
Media Transport

Fig. 3

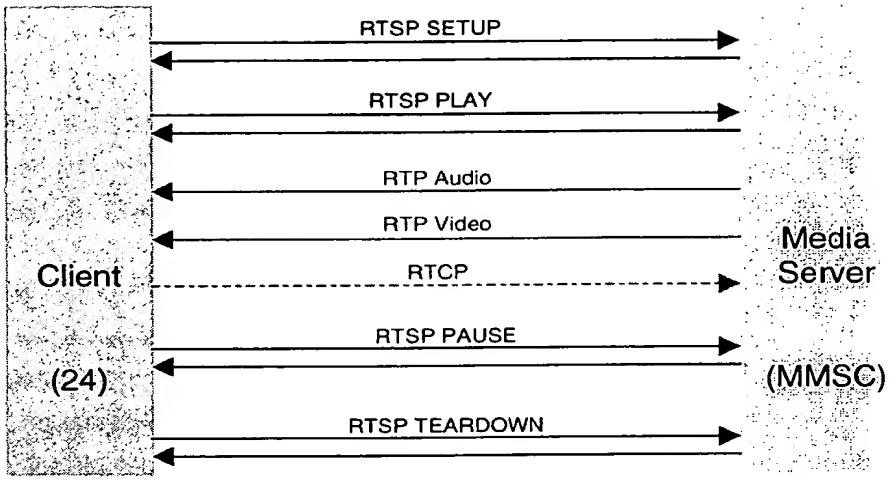
RTSP SETUP
RTSP PLAY
RTP Audio
RTP Video
RTCP
RTSP PAUSE
RTSP TEARDOWN
Client
(24)
Media
Server
(MMSC)

Fig. 4

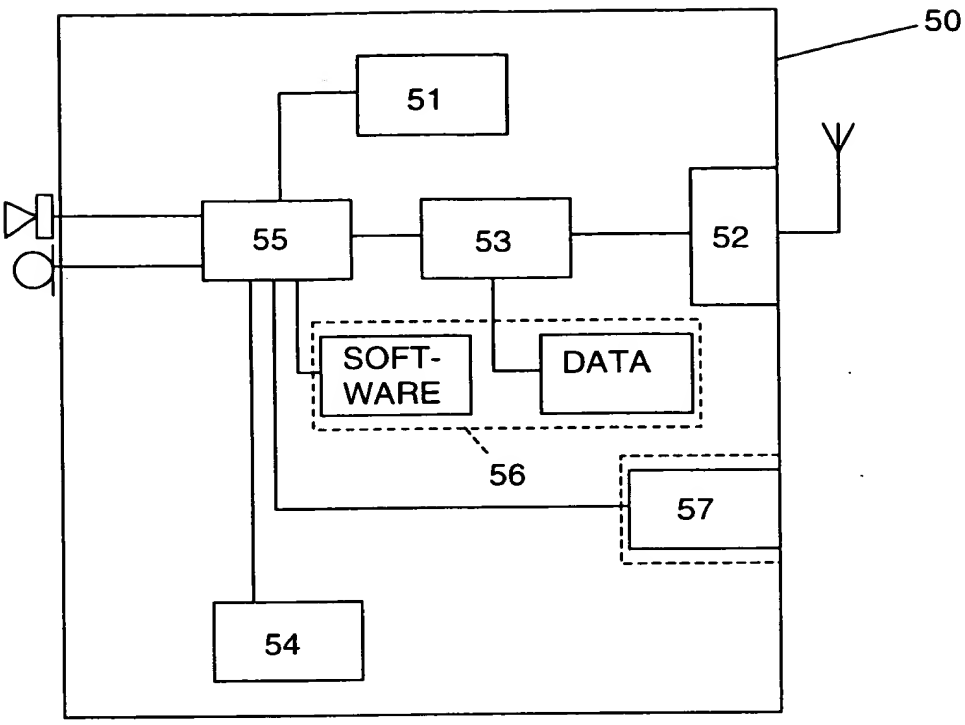

Fig. 5

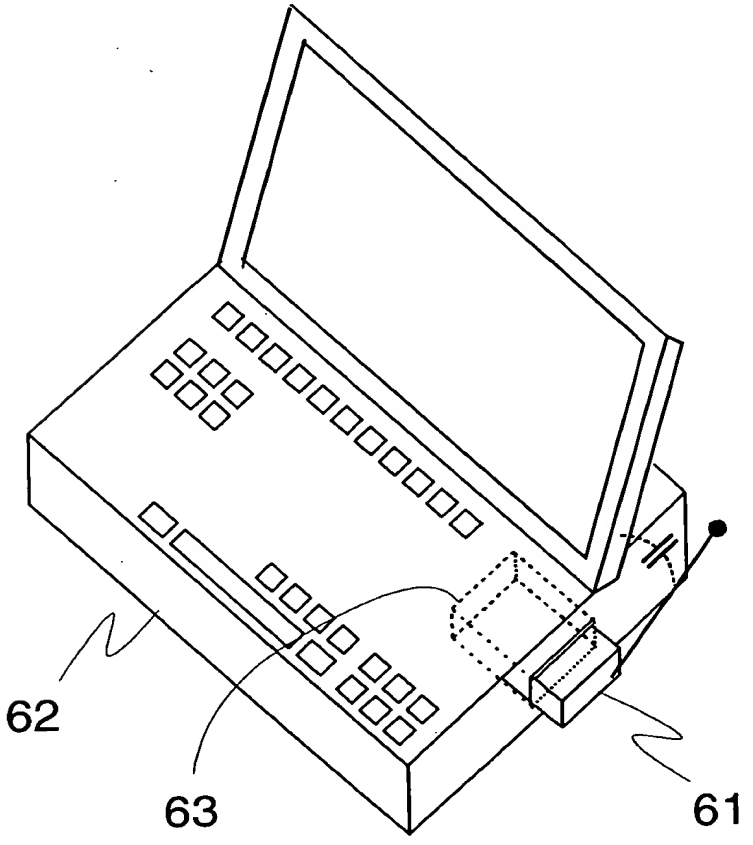

Fig. 6